



US005381158A

**United States Patent** [19]

Takahara et al.

[11] **Patent Number:** **5,381,158**[45] **Date of Patent:** **Jan. 10, 1995**[54] **INFORMATION RETRIEVAL APPARATUS**[75] **Inventors:** Kenichi Takahara, Tokyo; Atsuko Kawamoto, Yokohama; Takao Suzuki, Tokyo, all of Japan[73] **Assignee:** Kabushiki Kaisha Toshiba, Kawasaki, Japan[21] **Appl. No.:** 223,132[22] **Filed:** Apr. 5, 1994**Related U.S. Application Data**

[63] Continuation of Ser. No. 911,480, Jul. 10, 1992, abandoned.

[30] **Foreign Application Priority Data**

Jul. 12, 1991 [JP] Japan ..... 3-172770

[51] **Int. Cl.<sup>6</sup>** ..... G09G 5/00[52] **U.S. Cl.** ..... 345/156; 395/600; 395/161[58] **Field of Search** ..... 340/706, 707, 709, 710, 340/712; 345/156; 395/161, 600[56] **References Cited****U.S. PATENT DOCUMENTS**

4,414,537 11/1983 Grimes .  
4,628,305 12/1986 Ikeda ..... 345/150  
4,914,624 4/1990 Dunthorn .  
5,148,154 9/1993 MacKay et al. .... 340/712  
5,168,531 12/1992 Sigel ..... 340/709  
5,184,319 2/1993 Kramer ..... 340/706

**FOREIGN PATENT DOCUMENTS**

363089 9/1991 Japan .

**OTHER PUBLICATIONS**

R. A. Bolt, pp. 13-33, 62-77, and p. 162, "The Human Interface", 1984.

*Primary Examiner*—Jeffery Brier*Attorney, Agent, or Firm*—Oblon, Spivak, McClelland, Maier & Neustadt[57] **ABSTRACT**

An information retrieval apparatus features a three-dimensional display unit for displaying a set of indexes controlling attributes of a database in a three-dimensional image space in sight of a user with index display images so as to allow the user to visually recognize the set of indexes. An input unit detects motion patterns of the user's body against the index display images as input information and displays the motion patterns in the three-dimensional image space. An arithmetic operation unit recognizes the input information of the motion patterns received through the input unit and performs set logical operations of selected images in accordance with the motion patterns so as to collate and retrieve information from the database. The user can further directly operate index display images in a three-dimensional image space or a two-dimensional image space without the necessity of a keyboard and recognize input information with his body's motion patterns. The arithmetic operation unit performs set logical operations of indexes displayed with predetermined index display images so as to retrieve desired information from a database. Thus, even if the user does not have enough experience in operating conventional input and output units, such as a keyboard, he can readily and accurately retrieve desired objects from a medium such as a database.

**9 Claims, 20 Drawing Sheets**